AN ESSAY ON THE Proper Method For FORMING the *Man of Buſineſs*

IN A LETTER, &c.

By THOMAS WATTS,
Of the ACADEMY or ACCOUNTANT'S OFFICE for qualifying Young Gentlemen for Buſineſs, in *Little Tower-ſtreet.*

The Fourth Edition, with Additions and Corrections.

LONDON: Printed by GEO. JAMES.
Sold by C. KING in *Weſtminſter-Hall*, G. STRAHAN and E. SYMON in *Cornhill*, S. CLARK in *Birchin-Lane*, W. and J. INNYS, and J. BOWYER in S. *Paul's Church-yard*, and R. GOSLING near *Temple-Bar*. M DCC XXII.

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THE PREFACE.

THE *Design of the following* LETTER *is to shew the* Qualifications *to be learnt at this Academy, and the* Manner *of communicating them; which are every thing necessary for* Busi-

ness,

ness, *or* Accomplishment, *without the* common *Hindrances from Play-Days, Breakings-up, or other Vacations, or from any Delay occasioned by the Instructor's* private *Interest; the general Qualifications being always taught by the* Whole, *not by the* Quarter *or* Month.

The proper Age for Education here *is from about*

about Thirteen or Fourteen upwards; and the Young Gentlemen are not only such as are immediately designed for Trades, Merchandize, the Sea, Clerkships in Offices, or to Attorneys, or any other Employments in Business at home or abroad; but those *in general who are* not *designed for the Universities, or while they study* there, *intend*

intend to ſpend their Vacations in learning Accounts *and* Mathematicks, *or in going through the* Courſes of Experimental Philoſophy; *the whole Education being ſo calculated, as to anſwer the* Ends *of* thoſe *whoſe Fortunes are* not *abounding, as well as of the* Rich, *the Charge increaſing* only *with the* Number *of Qualifications to be attained.*

SIR,

THIS but juſt, that he who undertakes ſo difficult and important a Concern, as any Part of Education is, ought to give ſome Satisfaction, how capable he is of the Performance; eſpecially if he propoſes to do it in a Method out of the common Way, and in which others have not trod. In conſequence of this Reflexion, I here preſent you with thoſe *Sentiments* on the *Subject* of *Forming the Man of Buſineſs and Employment*, which the other day you were pleas'd to be ſo indulgent to, as to wiſh 'em com-

mitted to Paper. There is no Inclination, I assure you, SIR, wanting in me to serve the Publick; and I must confess, the Success I have had with the hopeful Young *Gentlemen* you have done me the Honour to place under my Care, is an Encouragement to me to pursue its Advantage in what I can: But still, if it should receive any Benefit from my Service, 'twill be obliged to the Deference due to a Judgment founded upon so large an Experience of Men and Business, and so accomplish'd as Yours, SIR; and to which, if I did not submitt, I should forfeit my Own.

Importance of Education in general.

SIR, I need not observe, that *Education* in general is of such vast Importance, and of such singular Use in the *Scene* of *Life*, that it visibly carries its own Recommendation along with it: For, on it in great measure depends *all* that we hope to be, every Perfection that a generous and well-dispos'd Mind would gladly arrive at. 'Tis *this* that stamps the Distinction of Mankind, and renders

renders one Man preferable to another; is almoſt the very Capacity of doing well, and remarkably adorns every Point of Life. This is what no body will diſpute; and therefore 'twould be impertinent to inſiſt on it. The Misfortune is, that, like a ſtately Miſtreſs, 'tis difficult of Acceſs; 'twill not condeſcend to ſhew itſelf at the firſt Viſit, but will be ſought for as Silver, and ſearch'd for as for hid Treaſure, or 'twill not be ſeen, much leſs won. Hence it comes, that ſome have not Reſolution enough to make Court to it; and many that have, are diſcouraged, and forced to give over the Purſuit, and ſit down under that unconceivable Loſs that is always inſeparable from the Want of it. Wherefore, an Attempt to make the Way to it more eaſy, may hope to be receiv'd with Indulgence, whatever the Succeſs may prove. And ſince the ſame Difficulty, in proportion, that attends the Purſuit of *Education* in general, affects the particular Branch

I am concern'd for, if I can aſſiſt its Growth, and make it thrive and flouriſh with the greater Vigour, as 'twill yield me no ſmall Pleaſure, ſo it will juſtify the Undertaking to all that underſtand their own Intereſt, and deſire (what's but natural for them to do) the Promotion of it.

Education for Buſineſs.

The ſuperiour Advantage of this Part of *Education* will eaſily be confeſſed by all who ſhall but turn their Eyes upon this great and magnificent CITY, and conſider that immenſe Wealth and extenſive Commerce, which makes this Nation known to, and honour'd in the moſt diſtant Places of the habitable World. *Hence*, as from the Heart to the Body, flow ſuch continual Streams, that diffuſe Life and Spirit, Trade and Riches, through the Whole; *here* the beſt Returns are made of a ripen'd Capacity, and an improvable Fortune; *here* your Men of *Years* treaſure up Abundance, and your young Men are beſt qualify'd to tread in their Induſtrious

ſtrious and Succeſsful Steps. The Man of *Commerce* is the Man of *Buſineſs*; 'tis his Element, and, to manage it well and ſucceſsfully, his Care and Labour.

But to ſet out well, is to have his Buſineſs half done; and 'tis the Deſign of what I *here* offer, to prevent his Miſcarrying; which, in great meaſure, depends on his *firſt* Appearance in the World, as that does upon the Qualifications he is Maſter of when he makes it. But I truſt he'll be ſecure in this Point, if managed in the Method I advance. But,

Not every Maſter of an Art equally qualify'd to teach it.

SIR, I muſt premiſe, and 'twill be own'd, that tho' He that undertakes to teach an ART muſt be Maſter of it, yet 'tis not every one that is Maſter of an Art, that is equally qualify'd to teach it; ſince many times it is much more difficult to communicate an Art to another, than it is to attain it ourſelves: And the Reaſon is viſible; becauſe the *Capacities* and *Tempers* he has to do with, may be as various as the Number of

of his Pupils; ſo that his firſt Care muſt be to make a right Judgment of their ſeveral *Capacities* and *Tempers*, which he muſt always have in his Eye, when he ſets them Rules, and deals out Inſtruction to them. 'Tis in vain, as 'tis unmerciful, to laſh on the Horſe that has no Heels; but the Tutor's Skill, and the Pupil's Induſtry, in time will improve and brighten the leſs promiſing and more cloudy Parts; and the narrow Genius will widen and enlarge under the Art of infuſing Inſtruction into it leiſurely and by degrees; but to pour all at once, is to throw it beſide the Underſtanding, and to leave it unwater'd, and conſequently unfruitful. Beſides, the ſlow and leſs forward Diſpoſition is not ſo happily drove on, as 'tis led and encouraged, by having laid before it ſuch Examples, as though they once labour'd under the ſame Diſadvantages of Nature, yet by Deſire, Diligence, and Reſolution, conquer'd the Ruggedneſs of

Different Capacities and Tempers require different Management.

of the Way, and at length arrived at great Maſtery and Perfection.

Secondly, On the other hand, tho', where Nature has been more generous of her Gifts, and the Pupil's more ready Apprehenſion and Felicity of Parts ſave the Inſtructor much Time and Labour; yet *there* the Exerciſe of his Skill and Judgment is rarely leſs, but generally more indiſpenſably required. For, as in the *former* Inſtance, he can't have too much Patience and Diligence, ſo in *this* he can hardly be enough on the Guard and Watch; but muſt ſtill have his Eye on his CHARGE, and narrowly obſerve his Motions; which if he does not find very various and inconſtant, 'tis more than he ought to expect; both Reaſon and Experience forbid it. And therefore, tho' he be at leſs Trouble to point out to him the Path he is to tread in, and the End it leads him to; yet to prevent his breaking out of it, and to confine him to it, often proves a ſufficient Trial of his Skill.

Beſides,

Beſides, the fineſt Parts, like your fineſt cutting Inſtruments, ſooneſt loſe their Edge, are ſooneſt tired, and turn'd in the Purſuit of Knowledge: If the Difficulty on the firſt Summons does not open and make way for them, they are too delicate upon a Repulſe to renew the Attack; inſtead of reſolutely cutting their Way thro', they retire and divert on ſome Object, if not ſenſibly prejudicial, yet at leaſt inſignificant to their Purpoſe.

Beſides, in *this* Caſe, the Imagination is apt to conceive ſo thick and haſtily, that the Ideas either ſtifle and deſtroy each other in the very Birth, or elſe crowd ſo faſt on the Underſtanding, that how inconſiſtent ſoever they be in their own Nature, yet it often can't apprehend or ſee the Difference; much leſs has it time to digeſt and ſort, and range them into their proper Claſſes; nor will they ſtay for the Operation of the Judgment, but ruſh on the World without its Paſport. And what, I pray,

can

can ſuch a huddled Production be good for? Only, like the Monſters of *Africa*, to be admired for its Imperfections and Deformities.

Wherefore, ſince as the luxuriant Vine, unleſs artfully dreſs'd and pruned, runs out into Wood, but yields nothing in the Time of Vintage, but an unprofitable Shew of Leaves; ſo your quick and flowing Parts, unleſs guided with ſingular Judgment and Dexterity, produce nothing beautiful or uſeful: How requiſite is it, that the *Youths* bleſſed with ſuch Advantages of pregnant Parts, ſhould have their Conceptions aſſiſted and regulated by the Care and Skill of an able Inſtructor, who ſhall, by the Rules of *Art*, direct their Progreſs through the Underſtanding and Judgment, ſo as they may at length be brought to Maturity, and prove of Service, and an Honour to the Owner; who himſelf, by that means, will be ſure to become an Honour to his Country.

But farther, as the different *Capacities* of Youth require a different Management for the Improvement of their Underſtandings; ſo a diſtinct and proper Regard muſt be had to their different natural Tempers and Diſpoſitions, which commonly are the more or leſs gentle and tractable, as their Parts are the leſs or more brisk and prominent. A *mild Temper* generally attends upon the leſs lively Parts, and ſucceeds beſt under the Influence of Kindneſs and Tenderneſs. *Here* a gracious Look is a mighty Encouragement; and the ſoft Voice has a ſtrange Charm in it, and is anſwer'd in the Returns of a ſurprizing Proficiency and Advancement in Knowledge; whereas a lowring and angry Brow, or a ſharp and ſevere Reproof, frightens and daſhes ſuch modeſt Tempers out of Countenance, and forces back their Parts into thoſe dark Receſſes, whence nothing but the mildeſt and ſweeteſt Way of Perſuaſion could draw them forth, and produce them on the

the Stage of the World. And tho' the *Confidence*, that is generally obſerv'd to attend on the more forward and ſprightly Parts, may, in order to reduce it to a modeſt and becoming Aſſurance, demand a Check; yet I muſt confeſs, I can't fall in with the Notion of the Neceſſity of *Severity* even in this caſe. A *generous* Spirit will regard Reaſon, and conclude it more fitting his Nature, to be led like a *Man*, than to be drove like a *Brute*. An *over ſevere* Uſage has, I am ſatisfy'd, been the Ruin of Abundance of Youth, which an *engaging* Temper, and a diſcreet Conduct might have made eminently uſeful in their Generations. By ſaying ſo, I do not deſign to be underſtood to recommend a ſenſleſs Indulgence of Youth in miſemploying their Time or Thoughts; *all* I mean is, that a great and active Spirit ſhould only be regulated, and kept within juſt Bounds, but not broken, or ſubdu'd to an *Indolence* or *Stupidity*; which is the fatal Effect generally of *too rigid* a *Diſci-*

pline. I have often obſerv'd the Succeſs of this *Method*, in improving the *Underſtanding*: But in *faſhioning* the *Manners*, ſuch a *Moderation* can have no Place. For, Vice muſt not have the leaſt Connivance, but, upon every Appearance, meet with ſuch a Rebuke, as ſhall make it effectually retreat, and not dare to ſhew its Face. And as your richeſt Soil is the moſt ſubject to Weeds, ſo 'tis found, your moſt pregnant Genius is the moſt ſuſceptible of ill *Impreſſions*. Here the *Senſes* have not Patience to wait on the Judgment, but out-run it, and leave *Conſideration* far behind 'em; ſo that Vice has eaſy Admittance, and makes a cheap Conqueſt of the naked and defenceleſs Mind. Wherefore, the Inſtructor ſhould have a very quick and careful Eye upon the *Avenue* that favours *Vice*; and, if *Perſuaſion* will not do, ſhould not forbear *Aſperity*, rather than ſuffer his *Charge* to lie expoſed to its Approaches, and in the way of Ruin.

Every Appearance of Vice to be ſuppreſſed.

What

What I have hitherto offer'd, in a manner *indifferently* affects the *Education* of the greener, as well as of the riper Years. But *thoſe* that come more *immediately* under my *Management*, are generally of *Stature* fit for *Buſineſs*, and in an *Age* when the Love of Idleneſs is too often ſtrong and predominant, and the Tide of Paſſion runs high, and carries all before it; and, drove on by the Vanity of *unthinking Youth*, impatiently brooks every neceſſary Reſtraint. But this is a *Criſis* of Life that often determines the whole *Courſe*; and therefore cannot be too narrowly obſerv'd, or too carefully provided for. *Buſineſs* and full Employment is the only Barrier to keep out the Enemy, and ſecure the Man: Vacant Hours move on heavily, and drag Ruſt and Filth along with them: A Breaking-up, or three or four Weeks *Vacation* in *this* time of Life, has often deſtroy'd the *Labour* of *Years*; and the *Youth*, by having nothing elſe to do, has contracted ſuch ill Habits, which, it may be,

Buſineſs a Preſervative againſt Vice.

be, no Time or Skill could ever after root out: I need only appeal to the Experience of *thoſe* who have mourn'd the Ruin of the once Hopeful and Promiſing, whether the Source of their Misfortunes has not very often proceeded from a Want of Employment. Not that a continual Intenſeneſs on *Buſineſs* is neceſſary or convenient. For certainly, well-timed and innocent Recreations, while they divert, ſtrengthen the *Faculties*, and add a freſh Sprightlineſs to the o'er-labour'd Mind: Only they ſhould be ſo allotted, as rather to ſeem *Reliefs* from *Study*, than Set Times for *Idleneſs*. *Children* may play by the *Almanack*; but he that is taking on him the Countenance of a *Man*, and intends for *Buſineſs*, ſhould rather let the *Exchange* be his Oracle for *Vacations*; eſpecially, when he conſiders that Time inſenſibly glides on to the fartheſt Diſtances; that *He* and his *Friends* are impatient till he lives for *himſelf*, and is ſettled to Satisfaction: And then what vaſt

Proper Recreations allowable and uſeful.

vaſt Hindrances and Interruptions muſt idle Days, Weeks and Months, needs be to him that perhaps has not above three or four Months to employ in Qualifying himſelf for *one* great *Buſineſs* of his *Life?*

'Twas theſe laſt Reflexions mov'd me to diſſent from the *Common Practice* in *this* reſpect, among many others, by breaking through the ancient *Cuſtom* of being *Idle* on all *Holy Days*, and in one regard or other loſing one Fourth of the Year in Vacations; which however pleaſing to the over-indulgent Mother, and Darling Child, muſt needs be of the moſt untoward Conſequence, as I have obſerv'd, in *our* Caſe. And I am the more confirm'd in *this*, and every other *Method* I have taken to promote the ſpeedy and perfect accompliſhing of *thoſe* placed under my *Inſpection*, in that, SIR, they entirely fall in with your *Sentiments*, and have likewiſe had the Approbation of moſt of thoſe Gentlemen I have had the Honour for ſome Years

Years to be employ'd by. And now, SIR, give me Leave, as ſhort as poſſible, *particularly* to touch on thoſe *Qualifications* neceſſary to *Form* the *Man* of *Buſineſs*. And,

Firſt, Whoever would be a *Man* of *Buſineſs*, muſt be a Man of *Correſpondence*; and Correſpondence can never be ſo commodiouſly, or at all to the Purpoſe maintain'd, as by the Uſe of the Pen: So that WRITING is the *Firſt* Step, and *Eſſential* in furniſhing out the *Man* of *Buſineſs*. And this *Qualification* is more excellent, as 'tis more uſeful in *Buſineſs*, and beautiful to the Eye, and may not improperly be conſider'd in two reſpects, as it proceeds from the *Eye* and the *Hand*: From the one we have *Size* and *Proportion*, from the other *Boldneſs* and *Freedom*. For as the Exactneſs of the *Eye* fixes the *Heights* and *Diſtances*; ſo the *Motion* of the *Joints*, and *Poſition* of the *Hand*, determine the *Black* and *Fine* Strokes, and give the ſame *Inclination* and *Likeneſs* in the

Writing.

the *Standing* and *Turn* of the LETTERS. But, in order to write *well*, there muſt be juſt Rules given, and much Practice to put 'em in Execution. Plain, Strong, and Neat *Writing*, as it beſt anſwers the Deſign for Uſe and Beauty, ſo it has moſt obtain'd among Men of *Buſineſs*; with whom all *affected* Flouriſhes, and quaint Devices of Birds and Bull-Beggars, are as much avoided, as Capering and Cutting in ordinary Walking. A full, free, open *Letter*, ſtruck at once, as it diſcovers more of Nature, ſo it gives a Maſterly Beauty to the Writing; to which may be added ſuch Ornamental *Turns* of the *Pen*, as ſeem rather deſign'd to fill up Vacancies on the Paper, than ſtudiouſly compos'd to adorn the Piece. In Flouriſhing, the *Fancy* would be ſo *Luxuriant*, was it not corrected by the *Judgment*, as almoſt to deſtroy the *End* of *Writing*; as *Airs* in *Muſick*, when too often repeated, or too long or too variouſly performed, diſorder the Har-

mony of a juſt Compoſure. But thoſe who are Excellent this Way, and diſplay Art and Nature by the gentle Turns of a well-guided Pen, do certainly deſerve their Commendations for their *Curioſity* and *Ingenuity*, if not for performing any thing much tending to the *Uſe* and *Benefit* of *Mankind*. But, as above, if Uſefulneſs and Beauty are the Excellencies of WRITING; that which will, with the greateſt Facility, contribute to theſe, is the *beſt* Method of *Teaching*. Suppoſing, therefore, the Make and Proportion of the Letters and Joinings to be once well fixed and underſtood, ſingle-line Copies will ceaſe to be of Service: For they are apt to create a *Stiffneſs* in the *Operation*, and a Formality more like painted than native Beauty; whereas, if the Learner is us'd to copy the common Forms of *Buſineſs*, Letters, Long Accounts, and Eſtimates, *&c.* his Hand will grow confirm'd in an Aptitude and Readineſs, which will inſenſibly arrive

at

at Perfection and Diſpatch; and give in *Writing*, what we admire in *Fine* Gentlemen, an *Eaſineſs* of *Geſture*, and *diſengag'd* Air, not to be attained by *Art*, but inſenſibly caught from frequently converſing with the Polite and Well-bred.

Secondly, The mutual Intercourſe and Dependence of Mankind upon each other, from whence ariſes a *Variety* of Affairs for Computation, makes ARITHMETICK the next neceſſary *Qualification* for the *Man* of *Buſineſs*: And *this* is more valuable, as 'tis the more exact, eaſy, and ſhort. If the Rules and Principles are once well fix'd and underſtood, frequent *Application* will make the *Practice* eaſy, and wonderfully reduce the *Operations*: The Art lies in giving as *few* Rules as poſſible, and clearly explaining them. Confounding Principles together, and Diverſifying them into ſeveral Rules, when they are built on the ſame Reaſon, is what has made ARITHMETICK ſeem ſo difficult; *Arithmetick.*

and the learning all by *Rote* has ſpoil'd many an Accountant. In Teaching ARITHMETICK, I ſhall have a ſpecial Regard, SIR, to your Advice, That the Learner be well exerciſed in the ſhort Rules of Practice and Computation; and that the Queſtions he is us'd to, be ſuch as generally occurr in *real* Buſineſs; which will not only be what he may moſt commonly meet with, but as they are about ſuch Things as are generally within his Hearing and Notice, ſo he will the more readily conceive the Reaſon of his *Operations*, and take the greater Delight in Working them: For there is Nothing ſooner perfects a Man in any Study, than the *Secret* of engaging him to find ſomething Pleaſant and Delightful in it; then the Labour goes down eaſily, and a little Confuſion or Perplexity only quickens, and gives a freſh Reliſh to the Satisfaction.

Merchants Accounts.

Thirdly, MERCHANTS ACCOUNTS is the third *Qualification*. The Unskill'd often confound this and *Arithmetick* together;

gether; inſomuch that 'tis ſometimes taken for *Arithmetick*; and ſo, he that is a good *Arithmetician*, is erroneouſly judg'd a good *Book-Keeper*: But *Book-Keeping* is a diſtinct Art; and is the Buſineſs of *Reaſon* to determine the juſt and proper *Debitors* and *Creditors*; of *Art* to methodize our Reſults, and of *Arithmetick* only to anſwer the ſeveral Queſtions of Computation ariſing. The *Italian* Method of Book-Keeping by *Double Entry*, as now practis'd by you *Gentlemen* of Commerce, may truly be allow'd to comprehend all Excellencies in Accounting: For, as the Judicious Author of the GENTLEMAN ACCOUNTANT obſerves, 'All other Methods, 'which particular Perſons have occa-'ſionally inſtituted for their own pri-'vate Concerns, are found in this; and 'all thoſe Methods, whatſoever they 'are, were, or can be invented, for the 'Uſe of any Accounts, are Parts of, 'and as it were taken out of the *Debi-tor* and *Creditor*; and ſo much as they

'want

‘ want of that, however in private
‘ Concerns ſerviceable enough, juſt ſo
‘ much they want of deſirable Perfe-
‘ ction. For the *Debitor* and *Creditor* is
‘ pure and perfect right Reaſon, and
‘ contains the whole material Truth
‘ and Juſtice of all the Dealing, and
‘ nothing elſe; and this not only be-
‘ tween the Accounter and his Traf-
‘ fickers, but alſo between all the ſeve-
‘ ral Traffickers one with another; ſo
‘ far as they have intermix'd in the Sub-
‘ ject Matter of the Accounts: And not
‘ only ſo, but alſo of the Incidents,
‘ Circumſtances, and Conſequences of
‘ the *Traffick*, ſuch as Eſtimates, Loſſes,
‘ or Advantages thereby; and all this
‘ in a perpetual State, ſo as every
‘ Queſtion that can be propoſed, con-
‘ cerning any Dealing, is anſwer'd al-
‘ moſt as readily as demanded: And no
‘ Perſon can be injur'd, who takes his
‘ Account upon the Stating of the Book
‘ ſo far as it runs; and in all Time
‘ even in After-Ages, the Tranſaction
‘ wi

'will be underſtood as well as if the 'ſame had been inquiſited at the very 'Inſtant of the Writing.' And in another Place the *ſame* excellent *Author* ſays, 'That 'tis a Method ſo Com-'prehenſive and Perfect, as makes it 'worthy to be put among the Sciences, 'and to be underſtood by all *Virtuoſi*, 'whether they ever intend to make uſe 'of it or no, but even for pure Specu-'lation, Curioſity, or rather Admira-'tion; as happens, when with ſome 'Pains we have attain'd the Knowledge 'of ſome Art or Skill, tho' leſs Com-'plex than this; which thro' the In-'vention of Paſt Ages, Univerſal Pra-'ctice, and in Matters of Intereſt (the 'fierceſt Engagement of Humane Wit 'and Stratagem) is reduced, as this is, 'to the ſtricteſt Compendium, and (re-'ſpecting the Intention or Uſe of it) 'to a conſummate Perfection, and in 'Rule and Method is ſo contracted 'and conciſe, that, without a Fault, 'nothing can be reſcinded from, or 'added to it.'

From

From all which 'tis abundantly evident, how ridiculous that common Error is, which many are apt to fall into, that Book-Keeping is different among Merchants and Men of Buſineſs; that hardly two make uſe of the ſame Method; and conſequently, that he who keeps Books well in one *Counting-Houſe*, is not qualify'd to do the like in another. But this falſe Objection can proceed only from not underſtanding the Art. A juſt and proper *Debitor* and *Creditor* is founded on Reaſon and Demonſtration; and that which is ſo in itſelf, muſt be ſo to every one that underſtands it, and therefore the Method muſt be in Effect the ſame; there being only *Double* Entry and *Single* Entry, that is indeed Method and no Method. By the firſt we have ſuch a Relation and mutual Dependence of Accounts, and a perpetual Balance of all, that Nothing can be afterwards placed in the Books with diſhoneſt or unfair Deſign; nor any Error made in the Progreſs left uncorrected.

No different Methods among Merchants.

corrected by the latter, the Way lies open to Fraud and Deceit, Confuſion certainly attends it; and there's no Poſſibility of aſcertaining Truth and Exactneſs; to all which every Method is liable, except the *Debitor* and *Creditor* by *Double Entry*. So that this Diſpute can be only between thoſe that do, and thoſe that do not underſtand Book-Keeping. And 'tis certainly true, that he who comes from a *Counting-Houſe* of Confuſion, or at beſt only recording Facts and Things *Simply* as they occurr, (as in common Shop-Books, *&c.* where they ſo ſpeciouſly mimick the true *Debitor* and *Creditor*, that the Ignorant really think it ſo; whereas nothing of that Art, Truth and Juſtice is found in it) can never be qualify'd to ſucceed him who has digeſted his Affairs into a moſt exact Order, and conciſe Method, according to Reaſon and Art. 'Tis true indeed, as Men are of different Complexions and Conſtitutions, and have different Ideas of Things, ſo every

Shop-Books.

Man may have ſome Peculiarity in his Method; but then this Difference cannot be in Eſſentials, nor in the general Reaſon and Manner of Book-Keeping, but only in Particulars indifferent, that are as ſoon known as ſeen.

But I have Reaſon, SIR, to ask Pardon for ſo long inſiſting on the Excellency and Uſefulneſs of that, which you practiſe with ſo much Exactneſs and Delight, and ſo happily recommend: But 'tis, as you call it, my *Darling Science*; as ſuch, I can't help dwelling on the Subject, and being zealous in propagating of it: To do which ſucceſſfully, that is, to complete a Book-Keeper, there's much more required than is generally taught. 'Tis not *Copying* a Sett of Books, or even being able to make a proper *Debitor* and *Creditor*, is all that's neceſſary: For almoſt in every Caſe, beſides the *Debitor* and *Creditor*, there are many Incidents, and ſeemingly ſmall Circumſtances, that will often puzzle a tolerable Theoretick Accountnat;

tant; and as 'tis allow'd in all Affairs, that generally the Circumſtances of an Action ſhould be as much conſider'd as the Action itſelf, therefore the *Learner* ſhould not only be inſtructed how to Enter, Poſt, and Cloſe an Account; but alſo in the previous and conſequent Incidents, as Terms of Agreement, and general Cuſtoms obſerv'd among Merchants and Men of Buſineſs, with the Forms of common Uſe in the Variety of Affairs, as Invoyces, Bills of ſeveral ſorts, Bonds, *&c.* as alſo the Cuſtoms and Duties, and ſhorteſt Ways of computing them, and the Nature of Remittances as to Bills of Exchange, or the Courſe, Riſe, Fall, *&c.* of the Exchange, and all other intervening Circumſtances that can be imagin'd to happen; and this not only as to the bare Form and Manner, but the Learner ſhould trace every of theſe as incident in each particular *imaginary* Caſe, as if he was tranſacting *real* Affairs. And, SIR, I have referr'd to this Place

(where the Uſe will appear moſt evident) the humble Thanks I owe for thoſe Books of *real Buſineſs* you were pleaſed to ſend me the other day, ſo juſtly kept, and conſiſting of ſuch Variety of Tranſactions: I know not any thing will more promote my Deſign for the Advancement of this Art; and therefore have made ſome Progreſs in digeſting a proper *Waſte-Book* of Caſes for the Uſes above, and ſhall find no ſmall Improvement from Stating them as my Copy directs; only, as you have advis'd me, I ſhall continually add ſuch Caſes to them, as may be drawn from any new Manner, or Place of Trading I ſhall be inform'd of, or can poſſibly get light into. And I'm perſuaded, if this Method was followed, and each *Profeſſor* qualify'd to perform it, we ſhould not find ſo many Youths on their firſt Entrance on Buſineſs ſo much Strangers to it; but the inſtructing *Counting-Houſe* might produce as accompliſh'd Clerks as the Merchants or Publick

lick Offices, provided the ſame Application was made uſe of.

But that which is call'd *Merchants Accounts*, is not only abſolutely neceſſary for every Merchant or Trader, but is what no Man of Buſineſs ſhould be Ignorant of, and is the beſt Method for Men of all Profeſſions and Eſtates to keep their own Accounts in; with this Difference, that as the Incidents alter with the Variety of Affairs, ſo they ſhould be accordingly apply'd and conſider'd; and the Knowledge of this Art (tho' not made uſe of in every one's private Concerns, yet) creates an excellent Capacity for Buſineſs in general, with Eaſe unriddles the moſt confus'd Accounts, and renders a Gentleman capable, with the greateſt Readineſs, to overlook his Affairs when managed by others; and I cannot better conclude my Thoughts on this Subject, than in Mr. *Locke*'s Words: 'Merchants Accounts, tho' not likely to help a Gentleman to get an Eſtate, yet poſſibly there

Book-Keeping neceſſary for Gentlemen of Eſtates.

Thoughts on Educat. Pag. 316.

'there is not any thing more of Uſe
'and Efficacy to make him preſerve the
'Eſtate he has. 'Tis ſeldom obſerv'd,
'that he who keeps an Account of his
'Income and Expences, and thereby has
'conſtantly under View the Courſe of
'his Domeſtick Affairs, lets them run
'to Ruin. And I doubt not, but many
'a Man gets behind-hand before he is
'aware, or runs farther on when he is
'once in, for want of this Care, or the
'Skill to do it. I would therefore ad-
'viſe all Gentlemen to learn perfectly
'Merchants Accounts, and not to think
'it is a Skill belongs not to them, be-
'cauſe it has received its Name, and
'has been chiefly practiſed by Men of
'Traffick.

Mathematicks.

Fourthly, The ſeveral Parts of the MATHEMATICKS are of that extenſive Uſe and Benefit to Mankind, that hardly any thing is to be done without them; conſequently the *Man of Buſineſs* can have no ſmall Share in theſe Sciences: For he that has a thorough Knowledge

ledge in them, muſt have the beſt Foundation laid, and a Mind exquiſitely furniſh'd for the undertaking of any Buſineſs. From *this* Fountain all *Arts* and *Sciences* flow; it enlarges the Mind, extends our Ideas, and ſtrengthens the Judgment. By *this* we even ſoar into other Worlds, and as it were pry into the very Secrets of Nature. And tho' the Knowledge of this vaſt uſeful and extenſive Learning is not abſolutely neceſſary for *every* Man, yet he that attains any Part thereof, will never repent his Labour. But there are *ſome* Employments of Life that cannot be carry'd on without them. All concern'd in Weight or Meaſure ſhould learn *Geometry* and *Mechanicks*: Every *Artificer* will *here* find the Foundation and Demonſtration of his *Art*: And indeed *Geometry* is the *Ground-Work* of all the other Parts of the *Mathematicks*, by which all *Operations* are performed and demonſtrated. Monſieur *Fontenelle*, in his Preface of the Uſefulneſs of *Mathematical* Learning,

Learning, ſays, 'That *Geometry* and *Al-*
'*gebra* are the *Keys* of all the Enquiries
'that can be made concerning *Magni-*
'*tude.*' Beſides, a thorough Know-
ledge herein greatly cultivates the Art
of Reaſoning, and may even ſupply the
Want of Logick itſelf.

For this Cauſe, thoſe that intend to
Reaſon juſtly, to Talk pertinently, to
take every Queſtion in its true Light,
and to Think cloſely, and Determine
with Clearneſs and Perſpicuity; thoſe,
I ſay, that would arrive to any degree
in Reaſon and Judgment, the ſhorteſt,
eaſieſt, and ſureſt Way, muſt attain to
Geometry. ſome Perfection in *Geometry*: This is
the Learning that is truly uſeful and
valuable; this is what ſo much obtains
in the World, and without which 'tis
now hardly poſſible to be a conſiderable
Man, but more eſpecially neceſſary for
thoſe that ſpeak in Publick; for all de-
ſigned for the Law, or are any ways
concern'd in the *Mechanical* Arts. And
The Law. having juſt mentioned the *Law*, I beg
leave

leave to make an Obſervation upon ſome Qualifications, that ſeem to be of the greateſt Uſe for Attorneys Clerks; and indeed, what is in the common Method required, is, that they underſtand a little *Latin*, and write the Law Hands. Thus much, 'tis true, is abſolutely neceſſary; but I have inſtructed young Clerks yet farther; they have learnt Book-Keeping, by which they have been render'd abundantly capable of adjuſting thoſe Accounts, which others, ignorant of that Art, muſt have apply'd to ſome Accountant to have ſettled for them; and Caſes of this nature frequently happen among thoſe that are employ'd by Merchants and Tradeſmen in Statutes of Bankrupts, *&c.* whoſe Books are a perfect Secret to thoſe that do not underſtand that incomparable Method they are generally kept in: And beſides this, I have often read *Euclid*'s *Elements* to them, that they might attain that excellent way of Reaſoning, the vaſt Benefit of which

'twould be impertinent to mention.

But to return to completely forming our Man of Buſineſs; if his Education ſhould be ſo liberal, while he is labouring at *Dry Geometry*, he may at times ſolace himſelf with a Piece of *Mechanicks*: For his Service therefore, I have lately publiſh'd, in the *Engliſh* Dreſs, Monſieur *Rohault*'s Treatiſe of *Mechanicks*, which I uſe as a kind of *Praxis* on *Euclid*'s Elements; the kind Reception it has met with in the World, may be a ſufficient Convincement how proper 'tis for the purpoſe deſign'd; 'tis on the Principles advanced in this Treatiſe, that all our modern Diſcoveries in Natural Philoſophy and Anatomy are built; therefore, tho' a Courſe of Experiments is at any time diverting and improving, 'twill much more be ſo after firſt reading ſuch an Introduction as this; then what is ſeen will be eaſily accounted for, and reduced into ſome ſolid Satisfaction and Improvement; from whence we may conclude, how neceſſary 'tis for Anato-

Anatomiſts and Surgeons, *&c.* to read ſome Piece of *Geometry* and *Mechanicks*.

Now, to carry my *Man of Buſineſs* a little higher yet, let him make ſome Progreſs in the wonderful Analytick Art, ALGEBRA, which may be render'd the Art of Reſolution or Reduction, whereby all unknown Quantities, howſoever intricately involv'd in any Queſtion propoſed, are reſolved into, and compared with thoſe that are known. In ſhort, *Algebra* is the great Myſtery of Invention, the rich Magazine of new Diſcoveries, the grand *Arcanum* ſo religiouſly concealed by the Ancients, whereby all their Theorems and Demonſtrations are found out, which they always took care to diſguiſe afterwards, by propoſing them in a quite contrary Method, and different Dreſs. As underſtanding the firſt Principles of this Art will eaſe the Learner of much Trouble and Pains, and Labour of Thinking in his Geometrical Studies; ſo it is abſolutely impoſſible to be a *Algebra.*

good Mathematician without a more thorough Acquaintance with it, and ſome competent Skill and Dexterity in this *ſpecious* Method of Calculation, which is as much preferable to the Arithmetick of Numbers, as a *general Rule* or *Theorem* is to the Application of it in a *particular* Caſe.

Perſpective, Architecture, Fortifications, and Gunnery, will all be found neceſſary Qualifications in different Parts of Life. The two laſt, that brave Man ſhould be well acquainted with, who would riſe in the Field of Glory, by his own Merit, ſcorning purchaſed Honours. The two firſt make the excelling Painter, and the noble Deſigner; for he only that is well inſtructed in theſe Arts, can lay down a juſt Plan for a fine Edifice, or adorn a ſtately Apartment with Scenes that may be admired as long as they are in being.

Country Gentlemen, Stewards of Eſtates, and all concern'd in Land, Building, or Farming, ſhould by all means underſtand

Surveying and Measuring.

anderſtand *Surveying* and *Meaſuring*; and indeed, for the Nobleman, or Gentleman's *Steward*, theſe Parts of the Mathematicks ſeem to be Eſſential Qualifications. For tho' his *Chief* Buſineſs be to receive Rents, let Leaſes, keep Courts, *&c.* and alſo to keep a juſt and clear Account of all; yet 'tis alſo a Pleaſure and Satisfaction to the Owner of the Eſtate to view his Lands in his Cloſet, that is, to have them *Survey'd*, and every Mannour, or particular Tenant's Farm neatly *Mapp'd*, the Timber he Sells, Builds, or Repairs with; as alſo Walling, Paling, Tiling, Cieling, or Painting, to be exactly meaſured: And who ſo proper to do this, or ſo fit to be truſted in an *Affair* of this nature, (where often is great Deceit and Damage by truſting to others) as the chief Manager, the *Land-Steward*, or *Rent-Gatherer?* But to inſtance in all the Concerns and Employments where ſome Parts or other of the Mathematicks are uſeful and neceſſary, would be as tedious

tedious as that Knowledge is extenſive: Therefore, SIR, I ſhall only juſt mention the peculiar Excellency of two Parts more, as Accompliſhments worthy the prime Man of Buſineſs, the Merchant; that is, GEOGRAPHY and NAVIGATION.

Geography. GEOGRAPHY not only teaches the *Situation* and *Diſtance* of Places and Countries, the *Knowledge* of the *Earth* in general and particular, but is one of the greateſt Accompliſhments in Converſation, and the very Inlet to *Hiſtory*, which informs us of the *Laws*, *Manners*, and *Cuſtoms* of *Nations*, their Advantages and Diſadvantages; from whence we may be enabled to form a right Judgment to promote the Intereſt of our own Country, and to lay down ſuch Rules as may be uſeful in our *private* Concerns.

Navigation. NAVIGATION is the ART by which our Ships are conducted through the wide-extended OCEAN, which carries off our Superfluities, and brings us home

our

our Conveniencies, and makes the Pleaſures, Riches, and good Things of the whole World common to all Mankind. To *us* of *this* Nation, 'tis our *Wealth* and *Defence*, and the Envy and Terror of our *Enemies*. And tho' this *Science* more immediately concerns the *Mariner* to be Maſter of it, yet the *Merchant* will ſcarce think it belongs not to him to have a Taſte thereof: For, from it he may draw great Advantages in Trade. For Inſtance, a Knowledge of the Length, Diſtance, and Safety of *Voyages*, will furniſh him with good Reaſons to conjecture the Riſe and Fall, and may point to him the moſt probable Markets to vend his Commodities.

Under this Head of *Mathematicks*, I beg leave to recommend the Art of DRAWING, as a Qualification worthy every Gentleman, as well as Man of Buſineſs; for tho' it is not neceſſary to come to a Perfection in Face and Feature; yet, to be able to take the Out-Lines of a Picture, to hatch neatly, to lay *Drawing.*

lay down Buildings, Trees, &c. to take a Landskip, juſtly repreſent Heights and Diſtances, and to finiſh and fill up the Perſpective, is what will be uſeful in forming to one's Self, and repreſenting to Others, a juſt Notion of any Deſign which cannot be ſo clearly conceived or expreſſed any other way. For this purpoſe therefore I have provided one of the ableſt Maſters in this Art to attend three times a Week.

Fifthly, To accompliſh the *Man of Buſineſs*, 'tis requiſite he ſhould be Maſter of the *Propriety of Expreſſion*. He that delivers his Senſe in *improper* Terms, converſes to his Diſadvantage; and his other Acquiſitions, be they what they will, often ſuffer for this *Imperfection*. He that abſurdly, or darkly, or dubiouſly, or with Difficulty, expreſſes his own Mind, will be thought not very ready in apprehending the Mind of others; or what is ſtill a greater Misfortune, brings his *Ingenuity* or *Integrity* under Suſpicion; whereas his

English Style.

Judgment

Judgment alone is in the Fault. And yet, according to the *common* Method of fitting *Young Gentlemen* for *Buſineſs*, a *Style* in Writing is what they ſeldom or never hear of; and the *Maſters* generally take themſelves to be no farther concerned, than that their Scholars ſhould write a *fair Hand*, without conſidering how monſtrous and ridiculous their Conceptions may appear. But ſurely, to ſpeak and write with *Propriety* and *Elegance*, has too great an *Influence* on *Buſineſs* to be neglected. I need not here in ſo plain a Caſe produce Reaſons of the Importance of this *Qualification*; Common Experience is an undeniable Proof of it. Who undertakes *Buſineſs* to moſt Advantage, or ſucceeds beſt in it? But he who ſhews he underſtands the Nature of it, by the Manner of his Addreſs, and who expreſſes himſelf without Ambiguity or Affectation. Subjects of different Natures will be treated of indeed in different Kinds of *Style*: One is peculiar to the Pulpit, another

to the Bar, and a third to common Converſation. 'Tis this *laſt* that can alone ſuit Commerce; which, tho' like other *Arts* and *Sciences*, it has proper *Rules* and *Terms* belonging to it, yet delights in a *Short* and *Familiar*, but withall a *Neat* and *Significant* Way of Expreſſion. So that the *Merchant* muſt converſe with his *diſtant* Correſpondent with no more *Stiffneſs*, than if he met him on the *Exchange*. He muſt not detain him an Hour for the Buſineſs of a Minute, nor put him to Pains to underſtand him, nor expreſs himſelf to be underſtood to his Damage. This would render a Correſpondence leſs agreeable to his Friend, and conſequently leſs beneficial to himſelf. *Majeſty* and *Grandeur* are a Stop to *Diſpatch*, whereby *Buſineſs* lives, and thrives, and flouriſhes. So that the Style for Commerce muſt be Conciſe, Perſpicuous, and Natural; not lined with ſwelling impertinent Epithets, but purely *Epiſtolary*, and expreſſing the Thoughts with the ſame *Facility*, as if

if the Correſpondent were Face to Face.

And now I am ſhewing how neceſſary for the carrying on *Buſineſs* happily, a proper *Style* is; let me not part with my CHARGE, till I recommend to him the Knowledge of the *Modern Languages*. He that deals or trafficks with ſuch whoſe Language he's a Stranger to, will ſoon be ſenſible not only of the Conveniency, but alſo of the Neceſſity of this *Accompliſhment*. There's no Man but muſt needs reap greater Satisfaction, and generally greater Advantage, from tranſacting his Affairs himſelf: That's the way for him to be ſure of the Condition they are in, and what he has to truſt to, and what Foot he is to proceed upon: Whereas to leave 'em to the Management of other Hands, which it may chance have not Skill enough to ſee and purſue his Intereſt; or if they have, may not have Integrity enough to do him Juſtice, is running the Hazard of being *undone*:

Modern Languages.

Or, if he ſhould have the Fortune to eſcape, yet it muſt be a continual Uneaſineſs to him, to think he is all the while at the Mercy of ſuch as might, if they would, have ruin'd him. But, to ſhorten my *Young Gentleman*'s Pains, 'twill be ſufficient for him to make himſelf Maſter of the FRENCH TONGUE, which will anſwer in a great meaſure for the reſt. For, at preſent, it ſeems to be the *Univerſal* Language. 'Tis ſo far Univerſal, that the Place is ſcarce known where 'tis not ſpoken; and we hardly find the *Foreigner*, of whatſoever Country he claims his Birth, but is able to tranſact his Affairs, or hold a Correſpondence in it. In ſhort, he muſt needs be much at a Loſs, and very unequal to *Buſineſs*, that has not attained to a competent Skill in this Language.

French.

I muſt confeſs, the Methods made uſe of in teaching it, are too various; and almoſt every Teacher affects ſome *Noſtrum*, which he is not a little fond of.

of. But this, I take it, will not be diſputed; That as a juſt Notion of Grammar, ſo the Opportunity of frequent Converſation is abſolutely neceſſary, if one would ever arrive at any Perfection in this Language; and therefore I have not only fix'd on a Maſter, that is capable of doing the firſt, but do entertain him conſtantly in my Houſe, where all thoſe *Young Gentlemen* that learn *French*, are obliged always to ſpeak it, and have their Maſter daily to converſe with.

And that there may be nothing wanting, if poſſible, to anſwer every one's Qualifications for *Buſineſs*, we beg leave to make the Learned Languages a part of our Care, it being a common Complaint, that what was learnt at the Grammar-School is forgot, while Youths are gaining theſe other Qualifications: Therefore I have prevail'd with an unexceptionable Gentleman, to read to thoſe that deſire it, the *Latin* and *Greek* Claſſicks *Latin* and *Greek*.

Claſſicks in private Lectures, out of our Times of *Buſineſs*.

But, SIR, I forget that there's nothing required to form the *Man of Buſineſs*, but what may be learnt with greater Advantage from your Practice, than from any thing I can offer. And I ſhould think it as great Indecency in me to addreſs peremptorily to ſo complete a Judge of this Subject, as 'twas in *Phormio* to talk of the Rules of War before *Hannibal*. Only pardon me, SIR, whilſt I obſerve, that tho' my *Young Gentleman* ſhould be furniſh'd with all theſe Qualifications I have inſtanced in, he's ſtill deficient in the main Article, if he has not imbibed the Knowledge of RELIGION and GOOD MANNERS along with 'em. And therefore, it muſt be his chief Care conſtantly to attend the ſtated Times of GOD's Publick Worſhip, as well as to pay him his Devotions in Private. He muſt be poſſeſs'd with a Senſe of the Neceſſity of GOD's Bleſſing upon his

Still incomplete, without Religion and Good Manners.

his Endeavours, if he would hope to ſucceed; nor can he expect the Divine Bleſſing, without living in Obedience to the Divine Will. Beſides, *Religion* obliges a Man to be juſt and conſcientious in his Dealing, punctual to his Word, and open, and fair, and honourable in all his Actions. A Man of this Character will be valu'd by all Men; and his Correſpondence coveted and courted; eſpecially, if Humility and a thankful Heart accompany his Succeſs and Proſperity, and diſcover themſelves in Compaſſion and Charity. If Patience and Temper, if Reſignation and Chearfulneſs of Mind, attend him in Misfortunes and Adverſity, (for the wiſeſt and greateſt Men are ſubject to ſome of theſe) ſuch a Man is in the likelieſt way to repair his Fortunes; which, if he ſhould fail in, yet he will ſit down with the Support of a good Conſcience, which is worth all the Comforts in the World beſides whilſt he lives, and will be remember'd when dead with

laſting

lasting Honour. When I am thus marking for the Youths design'd for Business, the Steps they are to take, if ever they would arrive at the End propoſed, and become Men of Conſideration and Importance; methinks I feel the Weight of that *Truſt* that lies on *us* who have the *Care* of them. What Vigilance, what Prudence, what Management, is not neceſſary for the ſucceſsful Diſcharge of our Duty! But equal Improvement muſt not be hoped for in ſuch as we are concern'd with but at *certain Hours*, and inſtruct *only* in *Arts* and *Sciences*, but who are at *Liberty*, becauſe out of the Reach of our *Obſervance*, to ſpend the reſt of their Time as they pleaſe; as may reaſonably be expected, and is generally found, in ſuch as are *conſtantly* under our more immediate *Inſpection*, confined to our *Walls*, and within the Caſt of our *Eye*. If theſe do not better anſwer the Expectations of their Friends, with regard both to their *Knowledge* and *Manners*, I do not ſee

how

how we ſhall be able to acquit ourſelves from Want of Ingenuity, or due Application in our Undertaking.

Thus, SIR, I have, in as little Compaſs as poſſible, traced out what I take to be requiſite to *build up the Man of Buſineſs*, and touch'd on the propereſt Manner of *Communicating* and *Enforcing* his *Qualifications*. The Copiouſneſs of the *Subject* has drawn out this *Letter* to a greater Length than I at firſt deſigned; but I hope for your uſual Candour and Pardon to,

SIR,

Your very Obedient,

and much Obliged

Humble Servant,

THO. WATTS.

A

COURSE

OF

Experimental PHILOSOPHY

CONTAINING,

I. *Demonstrations of the Universal Laws of* MOTION, *and the Force of all Simple and Compound* MACHINES.

II. *The Wonderful Effects of the Gravitation of* FLUIDS.

III. *The peculiar Properties of the* AIR, *consider'd as an Elastick Fluid.*

IV. *The Principles of* OPTICKS, *explaining the Nature of Vision, of Reflecting and Refracting Glasses, and of Light and Colours, according to Sr* Is. Newton's *Principles.*

NB. That the Course will contain not only all that is usual, but likewise some considerable Experiments which are entirely new; and that the *Apparatus* it self is new and complete, and every thing contrived according to the latest Improvements. The whole being very diverting and useful, not only for those who have learnt the *Mathematicks*, but for such as are not at all acquainted with that Study, by which they may with Ease and Pleasure come to the Knowledge of those Things, which cannot be attained any other way without great Labour and Application.

To be performed by BENJ. WORSTER, *A. M. and* THO. WATTS, *at the* Academy, *in* Little Tower-street.

To begin on the Day of 17

MECHANICKS.

CONcerning the Universal Properties of Bodies.

Of Matter and *Vacuum.*

Experiments to prove a *Vacuum.*

The

The Univerſal Law of Gravitation explained.

The Law of Coheſion, or the Attraction of the ſmall Parts of Bodies, deduced from the Aſcent of Fluids in ſmall Tubes, and between Glaſs-Plates, and Variety of other Experiments.

Experiments concerning the Repulſion of the Particles of Matter.

Of Electrical Attraction and Repulſion.

Experiments relating to Electrical Attraction.

The Electrical Phoſphorus.

Mercurial Phoſphorus.

Liquid Phoſphorus.

Solid Phoſphorus.

The Light of Phoſphorus augmented in *Vacuo*.

Concerning Motion in general.

Experiments to diſtinguiſh Motion from Velocity.

Experiments to explain the Nature of, and to find, the Center of Gravity in

all Bodies, and to diſtinguiſh it from the Center of Magnitude.

The Experiment of the double Cone rolling upwards.

A heavy Body, which of itſelf would fall from a Table, hinder'd from falling, by adding a heavier Body to it.

Experiments about the Falling, Sliding, and Rolling of heavy Bodies.

Concerning the Center of Motion.

Concerning the Diſtance and Line of Direction of a Weight and Power.

Experiments to ſhew the whole Myſtery of the Feats done by *Sampſons*, or ſtrong Men.

Of Simple Machines.

Of Balances, which are either Scales or Steel-Yards.

Of the four Kinds of Levers.

Of Pullies, ſingle and combined.

Of the Wheel and Axle.

Of the Inclined Plane.

Abſolute and Relative Gravity.

Of the Wedge.

Of

Of the Screw.

Compound Engines.

Sails of Ships, Wind-Mills, Water-Mills, *&c.* explain'd on theſe Principles.

Experiments to ſhew how Men or Horſes of unequal Strength may be made to carry or draw a Burden in Proportion to their Strength.

Experiments to ſhew the Advantage of great and ſmall Wheels in Coaches, Cars, *&c.*

A general Method to determine the Quantities of Friction in all Engines.

Sir *Iſaac Newton*'s firſt Law of Motion demonſtrated.

That the Compoſition of Forces in ſeveral Directions not contrary to each other, produces a new Direction in a Diagonal Line.

An Experiment to ſhew, that the Line of the Relative Aſcent and Deſcent of a projected Body, is the ſame; whether the Place from whence 'tis thrown be continually at Reſt, or in continual uniform Motion.

Objections

Objections againſt the Motion of the Earth, ſolv'd from this Principle.

The Centripetal and Centrifugal Forces of ſolid and fluid Bodies in Motion, explain'd and demonſtrated by Experiments.

Monſieur *Des Cartes's Vortices* exploded.

Introduction to the Theory of Projectiles and Motion of the Heavenly Bodies.

How a Body will move, when its Projectile Force either yields to, overcomes, or exactly balances that of Gravity.

Sir *Iſaac Newton's* ſecond Law of Motion demonſtrated.

An Experiment to ſhew that the Velocity of Falling Bodies is as the Times, and the Spaces gone thro' as the Squares of the Times of Falling.

The Force of Reſiſting Mediums conſidered.

A curious Experiment to explain the Foundation of the Art of Gunnery.

The

The Nature of Fortification explain'd from a large and curious Plan.

The Moon's Motion explain'd from the Doctrine of Projectiles.

The Motion of the Planets and Comets deduced from the ſame Principle.

The Solar Syſtem explain'd.

The Tides, and Phaſes of the Moon demonſtrated.

Experiments with the Load-ſtone.

Experiments concerning the Deſcent of Bodies on inclined Planes, being an Introduction to the *Theory of Pendulums*.

Experiments concerning Pendulums.

Center of Oſcillation explained.

A Cycloide deſcribed.

Cycloidal Cheeks for Pendulums.

The Motion of Pendulums altered by Heat and Cold.

That the Motion of the Waves in the Sea anſwers to the Motion of a Pendulum.

Sir *Iſaac Newton*'s third Law of Motion demonſtrated.

Flying and Swimming accounted for.

Of

Of the Nature and Cauſe of Elaſticity.

How to deſtroy the Elaſticity of ſome Metals.

Concerning the tremulous Motion of ſounding Bodies.

Experiments concerning the Laws of the Communication of Motion in hard and elaſtick Bodies.

HYDROSTATICKS.

CONcerning Fluids in general.

Experiments to prove that Fluids gravitate in Fluids of the ſame kind.

That Fluids of different Kinds gravitate upon each other.

That Fluids preſs in all manner of Directions at the ſame time.

That the Quantity of that Preſſure in all Fluids is proportional to the perpendicular Height of the Fluid in all Parts of the containing Veſſel.

That any given Quantity of Water, tho' never ſo ſmall, may be made to preſs with a Force equal to any given Weight, tho' never ſo large.

To

To raiſe any given Weight by the Force of a Man's Lungs only, provided he blows thro' a Tube proportionably ſmall.

An Experiment of Lifting a Weight by a Chain of inflated Bladders, applied to Muſcular Motion.

Several other Experiments to explain the Hydroſtatical Paradox.

Experiments to ſhew how high, and why, Water will riſe in Fountains and oblique Jetts, and the beſt way of making ſpouting Pipes.

The Expence of Water ſpouting from equal Holes at any given Diſtance from the Surface, computed, and ſhewn to be as the ſquare Root of thoſe Diſtances.

The Working of Syphons, ſucking, forcing, and lifting Pumps explained.

Experiments to ſhew that Bodies heavier than Water, when weighed in Water, loſe as much of their Weight as is equal to their Bulk in Water;

and Bodies lighter than Water will ſo ſwim in it, that a Quantity of Water equal in Bulk to the Part immerſed, will be equal in Weight to the whole Body.

How upon theſe Principles Lead, or any Metal, may be made to ſwim in Water, and even raiſed up by it.

The Hydrometer.

The hydroſtatical Balance to determine ſpecifick Gravities.

Glaſs Bubbles accounted for.

Pneumaticks.

EXperiments concerning the Nature of the Air in general.

That the Denſity and Spring of the Air is as the Force that compreſſes it.

That the Preſſure of the Air decreaſes according to its Diſtance from the Surface of the Earth.

Cupping-Glaſſes.

The Riſing and Falling of the Quick-ſilver in the Weather-Glaſs, explained and accounted for.

The

The different Sorts of Barometers.

Thermometers and Hydrometers of ſeveral Kinds.

The Effect of high Winds on the Barometer, ſhewn by an artificial Storm.

The Air-Pump, and Manner of its Working, explain'd.

Several Experiments, which directly prove the Weight, Preſſure, and Spring of the Air, by breaking Glaſs-Vials, the Senſe of Feeling, the Phænomena of Bladders, Glaſs-Bubbles, Fountains of ſeveral Sorts, and the Diving Bell.

Barometers *in Vacuo.*

The famous Experiments with the Hemiſpheres.

Wind-Gun.

The ſurprizing Motion of ſeveral ſorts of Liquors *in Vacuo.*

Experiments with the Condenſing Engine.

Experiments to prove that Sound can't be convey'd without Air, and that

'tis increaſed or diminiſhed according as the Air is rarified or condenſed.

That Fire and Flame are fed by the Air.

That Gunpowder is fired *in Vacuo* without any Exploſion.

The Effects of rarified, condenſed, and burnt Air upon the Life of Animals.

The Force of rarified Vapours in raiſing Water by Fire, *&c.*

With ſeveral other curious Experiments by the Air-Pump.

Opticks.

Concerning the Nature and Motion of Light.

Of Viſion in general.

That when Rays of Light are reflected, the Angle of Incidence is equal to that of Reflection.

Of Plane Mirrors.

The ſeveral Reflections from two Surfaces of Looking-Glaſſes conſider'd.

Of

Of Concave and Convex Mirrors,
A Concave Cylindric Mirror.
A Convex Cylindric Mirror.
Cylinder and Picture.
The Cauſe and Law of Refraction explained by Experiments.
Multiplying Glaſſes.
Experiments to ſhew the Nature of Convex and Concave Glaſſes, and the Manner of the Rays of Light paſſing through them, and uniting in their Focus's.
How to find the Focus of a Lens, and whether it be truly center'd.
Water made to burn, by collecting the Sun's Rays into a Focus.
Camera Obſcura,
The Magick Lanthorn,
The Diſſection of the Eye.
The Faults of Viſion ſhew'd by an Inſtrument.
Experiments to ſhew how the ſhort-ſighted and old Eyes may be help'd.
To ſhew why both Eyes ſee things only ſingle.

The

The Nature and Uſe of Microſcopes and Teleſcopes.

How to meaſure the Refraction of any ſort of Liquors.

An Experiment to meaſure the Refraction of the Air.

A new and moſt curious Experiment to ſhew the Circulation of the Blood in the Lungs of a Frog.

Sir *Iſaac Newton*'s Theory of Light and Colours prov'd by Experiments.

Experiments to ſhew the Cauſe of the Rainbow.

The Charge of going the Courſe is two Guineas and a Half; one on Subſcription, the Remainder the third Day of the Courſe.

There will be frequent Courſes; and Subſcriptions continually taken in at the Place of performing; at Mr. Innys's, *Bookſeller, near S.* Paul's *Church; and at Mr.* Clarke's, *Stationer, in* Birchin-Lane, *near the* Royal Exchange.

Those that are desirous may go over the Course again for one Guinea and a Half; and afterwards as often as they please gratis.

ADVER-

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